

# AUSTRALIAN MEGALOPTERA OR ALDER-FLIES,

WITH DESCRIPTIONS OF NEW GENERA AND SPECIES.

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(With three Text-figures.)

The Megaloptera are an archaic Order of Holometabolous Insects, which contains, at the present day, only about one hundred known species, all of them of large or moderate size. The Order is divisible into two very distinct Sub-orders, viz., the Sialoidea, or true Alder-flies, and the Raphidioidea, or Snake-flies. Of these, the aquatic Sialoidea are clearly the more archaic, the terrestrial Raphidioidea being a highly specialised offshoot from them.

The Raphidioidea are not represented in Australia, their place in the economy of Nature being already occupied by the older *Psychopside* of the Order Planipennia, whose larvæ, though differing in the nature of their mouth-parts, live, like those of the Snake-flies, in crevices of the bark of trees, and prey upon the insects frequenting them.

The Sialoidea, or true Alder-flies, are represented by some sixty species throughout the world. They may conveniently be divided into two very distinct families, according to the following key:—

- |   |  |             |
|---|--|-------------|
| { | Large insects (expanse 45 to 100 mm.), with three ocelli present; fourth joint of tarsus not bilobed; venation regular, with cross-veins weakly formed. Larvæ with eight pairs of lateral gills and a pair of hooked anal prolegs, but without any terminal filament ..... | CORYDALIDÆ. |
| { | Much smaller insects (expanse 20 to 40 mm.), without ocelli; fourth joint of tarsus strongly bilobed; venation less regular, with strongly developed cross-veins. Larvæ with only seven pairs of lateral gills and a terminal filament, but without any anal prolegs ..... | SIALIDÆ.    |

Of these two families, the *Corydalidæ*, containing the great majority of the genera and species of the Sub-order, may be again divided into two subfamilies, as follows:—

{	More than three cross-veins between R and Rs; head quadrangular.....	CORYDALINÆ.
	Only three cross-veins between R and Rs; head triangular.....	CHAULIODINÆ.

Up to the present, only one species of Alder-fly has been recorded from Australia, viz., *Archichauliodes guttiferus* (Walker). It is a large, dull-coloured insect, recorded occasionally from many localities in Eastern Australia, but nowhere very common. Both in size and markings, it is very variable, some individuals having large black spots on the wings (especially on the hind-wings) and others having none at all. The larva is a familiar object to naturalists in the Sydney district, being found under rocks and stones in small rocky creeks. In New Zealand, the allied species *A. dubitatus* (Walker), is very abundant, and its larva is much esteemed as bait for trout, being known as the "Black Creeper," a name that would suit the larva of the Australian species equally well.

Turning now to the smaller family *Sialidæ*, of which no representatives have hitherto been found in Australia or New Zealand, we find that, of the two known genera, *Sialis* is Holarctic, reaching from Canada through Europe and Siberia to Japan, and down into Asia Minor; while *Protosialis* is confined to the New World, one species being found as far south as Chili.

It would thus appear that, as the *Sialidæ* do not occur in the Oriental region, there is no possibility of their ever having reached Australia from the North. But, in so far as they are admittedly archaic forms, and one species is recorded from Chili, it has to be admitted that there is a bare possibility of their having been able to reach Australia from the South, provided that we admit the truth of the Antarctic Theory so ably championed by Mr. Hedley.

That being so, I have always kept in mind the possibility of a true Sialid being discovered in Tasmania, or on some isolated mountain-top in Eastern Australia. I now have the pleasure of

recording the discovery of two very distinct new species of this family, each of which will form the type of a new genus. The first of these was taken by Mr. G. H. Hardy, late of the Tasmanian Museum, Hobart, during a visit to Maria Island in December, 1915. Only a single specimen was taken; but it is in good condition, except for the loss of the antennæ. The second is a remarkable slender form, taken at light in December, 1916, on Mount Tambourine, South Queensland (elevation 1900 feet) by Mr. W. H. Davidson. Not realising what a prize he had got, Mr. Davidson unfortunately enclosed this specimen in an envelope with a letter to me; with the result that, when I received it, the insect was completely flattened out, and otherwise damaged. However, I managed to relax and set it, though the pin had to be inserted through the thorax from side to side, the wings being extended at right angles to the flattened thorax.

I have delayed publishing these fine discoveries, in the hope that further material might be obtained in better condition. Mr. Hardy again visited Maria Island last year, but he failed to find any further specimens of the new *Sialis*; likewise Mr. Davidson, who has kept a sharp look-out for his new species, has met with no further success. As the new insects are of great scientific interest, further delay is no longer justified.

The following key will enable the two new genera to be distinguished from each other and from the two genera already described, at a glance:—

- |     |   |   |                            |
|-----|---|---|----------------------------|
| (1) | { | Wings about one-third as broad as long, the costal field of the forewing noticeably broadened ..... | 2.                         |
|     |   | Wings much narrower, the costal field of the forewing not noticeably broadened.....                 | 3.                         |
| (2) | { | Hindwing with $M_{1+2}$ and $M_{3+4}$ both simple veins .....                                       | <i>Sialis</i> Latr.        |
|     |   | Hindwing with $M_{1+2}$ forked, $M_{3+4}$ simple.. .....  | <i>Austrosialis</i> , n.g. |
| (3) | { | Both wings with $R_{2+3}$ and $R_{4+5}$ both forked .....   | <i>Stenosialis</i> , n.g.  |
|     |   | Both wings with $R_{2+3}$ simple, and $R_{4+5}$ forked ...  | <i>Protosialis</i> Weele.  |

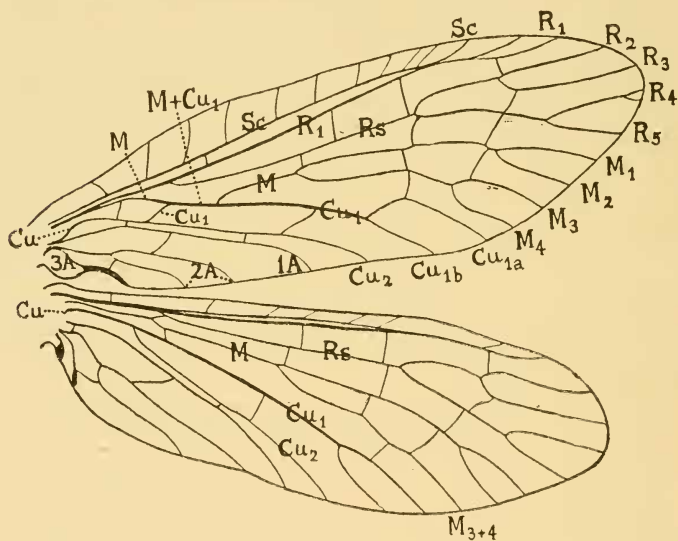
#### AUSTROSIALIS, n.g. (Text figs.1-2).

Closely related to *Sialis* Latr. General colouration black, with orange-red prothorax and smoky wings. Forewing with

about ten veinlets in costal space, hindwing with about six. In forewing,  $Cu_1$  unites with M for a space, the short basal free portion of  $Cu_1$  resembling an oblique cross-vein. The fused portion,  $M + Cu_1$ , is continued by  $Cu_1$  itself as a stout vein in line with it, whereas M departs from it anteriorly at a sharp angle. In hindwing, Cu remains quite distinct from M. In forewing, the full complement of branches is present for both Rs and M; in hindwing, there is one less for M,  $M_{3+4}$  remaining unbranched. Neither  $R_2$  nor  $R_3$  is secondarily forked, as is the case with one or both in *Sialis*.

Genotype, *Austrosialis ignicollis*, n sp.

Hab.—Tasmania.



Text-fig. 1.

Wings of *Austrosialis ignicollis*, n.g. et sp. In forewing,  $M + Cu_1$  is the fused portion of M and  $Cu_1$ . Rest of notation as usual in the Comstock-Needham system. The small forking distally on  $R_4$  does not occur on the left forewing. (Hindwing 12 mm. long).

The black and orange colouration is also that of *Protosialis*, to which the Chilean species belongs. It is also interesting to note that, in the number of its branches to Rs and M, the new

genus offers an exact parallel to the oldest Trichoptera, in which  $M_{3+4}$  is always a simple vein in the hindwing.

*AUSTROSIALIS IGNICOLLIS*, n.sp. (Text-figs.1-2).

Total length, 8 mm.; abdomen, 4 mm.; forewing, 14 mm.; hindwing, 12 mm.; expanse, 28.5 mm.

Head shining black, smooth anteriorly, with a shallow mid-dorsal depression; the large occipital region curiously sculptured, with raised longitudinal and circular areas, arranged as shown in Text-fig.2. Antennæ with large, stout basal joint, black; the rest missing. Mandibles black, tipped with orange-red.

Thorax: *prothorax* bright orange-red, flattened cylindrical in shape, with slightly indicated mid-dorsal groove; less than half as long as wide, the width being slightly less than that of the occiput. *Pterothorax* jet black. Legs black, of medium length and slenderness.

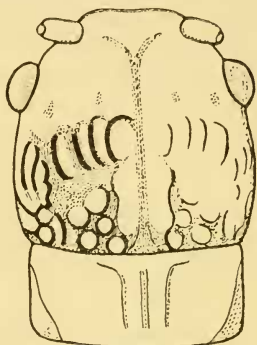
Abdomen [shrivelled] dull blackish.

Type, in Coll. Tillyard.

*Hab.*—Maria Island, East Coast of Tasmania. A unique specimen, probably a female, taken on Dec. 29th, 1915, by Mr. G. H. Hardy.

*STENOSIALIS*, n.g. (Text-fig.3).

Closely related to *Protosialis* Weele. General colouration brown, with pale smoky-brown wings. Forewing with narrow costal space containing only four veinlets, the hindwing with only two. The arrangement of the veins M and Cu is the same as described for *Austrosialis* above, and the number of branches for the veins Rs and M is the same as in that genus. The cross-



Text-fig.2.

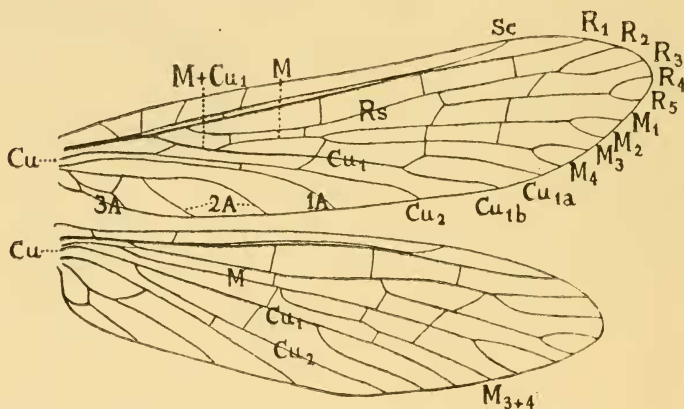
\* Head and prothorax of *Austrosialis ignicollis*, n.g. et sp., to show sculpture of the occiput; the light arranged so as to fall nearly horizontally; ( $\times 15$ ).

vein between  $R_{2+3}$  and  $R_{4+5}$  is exceptionally oblique in direction.

*Genotype*, *Stenosialis australiensis*, n.sp.

*Hab* - South Queensland.

As with *Austrosialis*, so with this genus; the arrangement of the branches of Rs and M corresponds exactly with that of the oldest Trichoptera,  $M_{3+4}$  being branched in the forewing, but simple in the hind. One is tempted to ask, is this merely the result of a chance convergence, or does it indicate a closer relationship between the two Orders Megaloptera and Trichoptera than has hitherto been suspected?



Text-fig. 3.

Wings of *Stenosialis australiensis*, n.g. et sp. Notation as in Text-fig. 1.

(The wings of the type-specimen being considerably torn, the figure was completed by combining portions of both right and left pairs of wings). (Hindwing 10 mm. long).

*STENOSIALIS AUSTRALIENSIS*, n.sp. (Text-fig. 3).

*Total length*, 8 mm.; *abdomen*, 4 mm.; *forewing*, 11.5 mm.; *hindwing*, 10 mm.; *expanse*, 25 mm.

*Head* brownish, a darker area posteriorly on occiput, isolating several paler raised circular areas placed close together on either side of the mid-dorsal depression. *Eyes* dark brown. *Antennae* dark brown, the basal joint large and stout, the second joint small; the rest missing.

*Thorax* dark brown. *Prothorax* apparently slightly wider than occiput. *Legs* brown. [Too crushed for accurate description].

*Abdomen* [shrivelled] blackish basally, shading to brown anally.

Type, in Coll. Tillyard.

*Hab.*—Mount Tambourine, South Queensland (1900 feet). A unique specimen, probably a female, taken on Dec. 17th, at light, by Mr. W. H. Davidson.

In concluding this paper, I desire to record my grateful thanks to Mr. Hardy and Mr. Davidson for these two fine species, and to congratulate them on their discoveries. The knowledge that, in this Order, archaic forms of great scientific value are still to be found in isolated places in Australia, should stir up other entomologists to look out for these insects, which are easily caught and recognised.